

The specification and drawings have been amended. A new abstract is submitted. Claims 1, 3, 4, 5, 10, 12, 14, 19, 21, 30, 34, 35, 41, 45, 52, 53, 54, 55, 64, 69, 73, 74, 79, 84, and 85 have been amended. Claims 6-8, 11, 13, 15-17, 20, 44, and 83 have been cancelled without prejudice or disclaimer to the subject matter contained therein. Claims 56-63 are withdrawn from consideration. Claims 99-101 have been added. Claims 1-5, 9, 10, 12, 14, 18, 19, 21-43, 45-55, 64-84, and 86-101 are now pending in the application. No new matter has been added. Applicants respectfully request favorable reconsideration and further examination of this application in view of the following amendments and remarks.

Amendments to the claims begin on page 3 of this paper.

Remarks begin on page 30 of this paper.

B. Amendments to the Specification:

Please replace paragraph 48 with the following amended new paragraph:

[0048] Turning to the rotor winding control block diagram 32, the command motor velocity 52 can be set either internally or externally from the rotor 14. The current (i.e., instantaneous) motor velocity 54 is measured using an angular position feedback device 56 and the motor velocity 54 is fed to a velocity calculator 57. The difference between the command motor velocity 52 and the instantaneous motor velocity 54 is determined by comparing the two quantities in a subtractor 58AB. The difference is then further processed as the rotor flux vector amplitude 60.

Please replace paragraph 50 with the following amended new paragraph:

[0050] Those skilled in the art will appreciate that somewhere within the rotor winding control circuitry the control and power signals must be moved from a stationary portion of the machine (i.e., the stator 12) to a rotating portion of the machine (i.e., the rotor 14). One method for achieving this type of transference is illustrated generally at 34, wherein a rotary transformer 77 and its affiliated circuitry are used for converting the signals to be transferred 74 to the rotor 14 to an AC waveform by an analog AC waveform encoder 76 (hence transformable). The encoded AC waveforms are then passed from the rotary transformer primaries 78 across an air gap 80A to the rotary transformer secondaries 82. The signals 74 are then re-interpreted as useful signals by a signal decoder 84 and can be used by a control circuit to provide the necessary current control to the rotor windings 70, 72. A further description of the conversion to AC waveforms process is provided in the description associated with Figs. 8-10 below

including a special signaling timing diagram. A more detailed description of the re-interpretation as useful signals is provided in the description associated with Figs. 11 and 12 below.

Please replace paragraph 61 with the following amended new paragraph:

[0061] Figs. 14A-C illustrate one embodiment of a first motor 156 having a mechanical rotor 14 that includes three rotary transformers 77A, B, C. Fig. 14C illustrates a side view of one embodiment of the first motor 156, a housing 164 and a stator 12 cut away to expose the rotor ~~14~~iron 170 and the stationary electronics 174, which can include various communication devices. At one end of the first motor 156, there are located the rotating electronics 172, the three rotary transformers 77A, B, C, and the position feedback device 56. The rotary transformers 77A, B, C each include the rotary transformer primary windings 78 and the rotary transformer secondary windings 82. Electrical power and signals can be transferred to and from the rotary transformer primary windings 78 and the rotary transformer secondary windings 82 across the air gap 80A. In one embodiment such components are located in the recited order from left to right. Each end of the shaft 158 is shown supported by a bearing 166. The rotating electronics 172 for the rotor 14 are described above as the second rotor control circuit 136 and is illustrated schematically in Fig. 12. Fig. 14A illustrates an end view of the first motor 156, showing the shaft 158, the rotor-winding end turns 160 and the stator-winding end turns 162. The external housing 164 and the bearing 166 have been omitted for clarity. Fig. 14B illustrates a sectional view of the rotor 14 of the first motor 156 in

the winding area, showing the rotor-windings 70, 72, the stator windings 37, the central shaft 158 and the stator lamination stack 168.

Please replace paragraph 62 with the following amended new paragraph:

[0062] Figs. 15A-C illustrate one embodiment of a second motor 176 having a mechanical rotor 14 that includes four rotary transformers 77A, B, C, D. Fig. 15C illustrates a side view of one embodiment of the second motor 176, a housing 164 and the stator 12 cut away to expose the rotor 14 iron 170 and the stationary electronics 174, which can include various communication devices. At one end of the second motor 176, there are located the rotating electronics 172, the four rotary transformers 77A, B, C, D and the position feedback device 56. The rotary transformers 77A, B, C, D each include the rotary transformer primary windings 78 and the rotary transformer secondary windings 82. Electrical power and signals can be transferred to and from the rotary transformer primary windings 78 and the rotary transformer secondary windings 82 across the air gap 80A. In one embodiment such components are located in the recited order from left to right. Each end of the shaft 158 is shown supported by the bearing 166. The rotating electronics 172 for the rotor 14 are described above as the first rotor control circuit 128 and are illustrated schematically in Fig. 11. Fig. 15A illustrates an end view of the second motor 176, showing the shaft 158, the rotor-winding end turns 160 and the stator-winding end turns 162. The external housing 164 and the bearing 166 have been omitted for clarity. Fig. 15B illustrates a sectional view of the rotor 14 of the second motor 176 in the winding area, showing the rotor-windings 70, 72, the stator-windings 37, the central shaft 158 and the stator lamination stack 168.

Please replace paragraph 63 with the following amended new paragraph:

[0063] Figs. 16A-C illustrate one embodiment of a third motor 178 having a mechanical rotor 14 with built-in permanent magnets 180 that includes three rotary transformers 77A, B, C. Fig. 16C illustrates a side view of one embodiment of the third motor 178, a housing 164 and the stator 12 cut away to expose the rotor ~~14~~iron 170 and the stationary electronics 174, which can include various communication devices. At one end of the third motor 178, there are located the rotating electronics~~174~~172, the three rotary transformers 77A, B, C and the position feedback device 56. The rotary transformers 77A, B, C each include the rotary transformer primary windings 78 and the rotary transformer secondary windings 82. Electrical power and signals can be transferred to and from the rotary transformer primary windings 78 and the rotary transformer secondary windings 82 across the air gap 80A. In one embodiment, such components are located in the recited order from left to right. Each end of the shaft 158 is shown supported by the bearing 166. The rotating electronics 172 for the rotor 14 are described above as the second rotor control circuit 136 and are illustrated schematically in Fig. 12. Fig. 16A illustrates an end view of the third motor 178, showing the shaft 158, the rotor-winding end turns 160 and the stator-winding end turns 162. Also shown in the end view of the third motor 178 is an end view of the built-in permanent magnets 180. The external housing 164 and the bearing 166 have been omitted for clarity. Fig. 16B illustrates a sectional view of the rotor 14 in the winding area, showing the rotor windings 70, 72 and the stator windings 37, the central shaft 158, the stator lamination stack 168 and a section of the built-in permanent magnets 180.

Please replace paragraph 65 with the following amended new paragraph:

[0065] Figs. 17A-C illustrate one embodiment of a fourth motor 182 having a mechanical rotor 14 that includes a generator 184 and a single rotary transformer 77A. In part, the power generated by the generator 184 is consumed by the rotary electronics 172. When the motor is stationary, power is coupled to the rotor windings across air gap 80B. Fig. 17C illustrates a side view of the fourth motor 182, the housing 164 and the stator 12 cut away to expose the rotor ~~14~~iron 170, the rotating electronics 172 and the stationary electronics 174, which can include various communication devices. At one end of the fourth motor 182, there are located the rotating electronics 172, one rotary transformer 77A, the power generator 184 and the position feedback device 56. The rotary transformer 77A includes the rotary transformer primary windings 78 and the rotary transformer secondary windings 82. Electrical power and signals can be transferred to and from the rotary transformer primary windings 78 and the rotary transformer secondary windings 82 across the air gap 80A. In one embodiment, such components are located from left to right in the order recited. Each end of the shaft 158 is shown supported by a bearing 166. The rotating electronics 172 for the rotor 14 are described above as the self-generated power rotor circuit 148 and are illustrated schematically in Fig. 13. Fig. 17A illustrates an end view of the fourth motor 182, showing the shaft 158, the rotor-winding end turns 160 and the stator-winding end turns 162. The exterior housing 164 and bearing 166 have been omitted for clarity. Fig. 17B illustrates a sectional view of the rotor 14 in the winding area, showing the rotor windings 70, 72, the stator windings 37, the central shaft 158 and the stator lamination 168.

Please replace paragraph 65 with the following amended new paragraph:

[0068] Fig. 18B illustrates a cross-section of one embodiment of a second mechanical rotary transformer 185. The rotary transformer includes a ferrite 186, a primary winding 188 and a secondary winding 190. The rotary transformer secondary winding 190 is attached to the shaft 158 and rotates about the shaft 158. The signals 74 to be transferred to the rotor 14, are encoded to analog AC waveforms 76 and are coupled from the rotary transformer primary winding 188 to the rotary transformer secondary winding 190 across the air gap ~~192~~280C. In one embodiment, the second mechanical rotary transformer 185 is formed in a side-by-side manner, thus trading off space taken up by the shaft 158 for a smaller overall diameter.